

CLAIMS

1. A method of determining the rate of dilution of the lubricating oil by the fuel of an internal combustion engine, wherein:

- 5 - either the lubricating oil or the fuel is marked with a radioactive tracer,
- the radioactivity of an oil sample is measured using a detector that is sensitive to the radioactive radiation emitted by the radioactive tracer, and
- 10 - the results of these measurements are transmitted to a computer which calculates from these results the rate of dilution of the lubricating oil by the fuel.

2. A method according to claim 1, wherein it is the lubricating oil that contains the radioactive tracer.

3. A method according to claim 1, wherein it is the fuel that
15 contains the radioactive tracer.

4. A method according to one of the preceding claims, wherein the oil sample for which the radioactivity is measured is carried towards the detector and then re-injected into the oil system of the engine by a deviation.

20 5. A method according to claim 4, wherein the deviation takes the oil sample from an area of the oil system of the engine which is under no or low oil pressure.

6. A method according to any of the preceding claims, wherein the radioactive tracer is an organic or mineral compound of a
25 radioactive element, preferably an organic compound of a radioactive element.

7. A method according to one of the preceding claims, wherein the radioactive element has a half-life of less than 3 years, preferably less than 1 year, and in particular less than 30 days.

30 8. A method according to claim 7, wherein the radioactive element is selected among ^{22}Na , ^{65}Zn , ^{45}Ca , ^{35}S , ^{32}P , ^{47}Ca , ^{99}Mo , ^{82}Br , ^{64}Cu , $^{99\text{m}}\text{Tc}$, ^{28}Mg , ^{68}Ge , ^{69}Ge , ^{77}Ge , ^{85}Sr and ^{56}Co .

9. A method according to claim 8, wherein the radioactive tracer is selected among the tetra-alkyl germaniums containing ^{69}Ge ,
35 preferably among the tetra-hexyl germaniums, the tetra-heptyl germaniums and the tetra-octyl germaniums, or a mixture thereof.

10. A method according to any of the preceding claims, wherein the detector is an ionizing radiation detection probe.

11. A device for monitoring the rate of dilution of the lubricating oil by the fuel of an internal combustion engine, wherein it comprises:

- 5 – an internal combustion engine, lubricated by a lubricating oil and supplied with an air/fuel mixture, with either the lubricating oil or the fuel containing a radioactive tracer,
- a means allowing the temporary sampling and the re-injection, continuously or discontinuously, of an oil
10 sample from the oil system of the engine,
- a detector, sensitive to the radioactive radiation emitted by the radioactive tracer present in the oil sample, which is in the immediate vicinity of this means of temporary sampling and re-injection, and
- 15 – connected to said detector, a computer programmed to calculate, from the results provided by said detector of the measurements of the radioactivity of the oil sample, the rate of dilution of the lubricating oil by the fuel.

12. A device according to claim 11, wherein it is the lubricating
20 oil that contains the radioactive tracer.

13. A device according to claim 11, wherein it is the fuel that contains the radioactive tracer.

14. A device according to either of the claims 11 and 12, wherein the means allowing the temporary sampling and the re-
25 injection, continuously or discontinuously, of an oil sample is a deviation.

15. A device according to claim 14, wherein the deviation samples and re-injects the oil sample in an area of the oil system of the engine which is under no or low oil pressure.

30 16. A device according to any of the claims 11 to 15, wherein the radioactive tracer is an organic or mineral compound of a radioactive element, preferably an organic compound of a radioactive element.

35 17. A device according to any of the claims 11 to 16, wherein the radioactive element has a half-life of less than 3 years, preferably less than 1 year, and in particular less than 30 days.

18. A device according to claim 17, wherein the radioactive element is selected among ^{22}Na , ^{65}Zn , ^{45}Ca , ^{35}S , ^{32}P , ^{47}Ca , ^{99}Mo , ^{82}Br , ^{64}Cu , $^{99\text{m}}\text{Tc}$, ^{28}Mg , ^{68}Ge , ^{69}Ge , ^{77}Ge , ^{85}Sr and ^{56}Co .

5 19. A device according to claim 18, wherein the radioactive tracer is selected among the tetra-alkyl germaniums containing ^{69}Ge , preferably among the tetra-hexyl germaniums, the tetra-heptyl germaniums and the tetra-octyl germaniums, or a mixture thereof.

20. A device according to any of the claims 11 to 19, wherein the detector is an ionizing radiation detection probe.